Commonwealth of Kentucky
Division for Air Quality

PERMIT STATEMENT OF BASIS

DRAFT TITLE V PERMIT NO. V-99-026 REVISION 1
WESTLAKE PVC
CALVERT CITY, KY
MAY 30, 2002
KENNETH LIBERTY, P.E., REVIEWER
PLANT I.D. # 21-157-00040
APPLICATION LOG # 54216

SOURCE DESCRIPTION:

The Westlake PVC Corporation is a synthetic organic chemical manufacturing industry (SOCMI) falling under SIC Group 28. Polyvinyl chloride (PVC) is produced at this facility by polymerization of vinyl chloride monomer (VCM) in batch reactors. Following polymerization, the PVC slurry is sent to steam stripping columns to separate the PVC from unreacted VCM which is recycled back into the process. Following the stripping operation, the PVC resin is dried, screened and finally sent to one or more of 16 PVC storage silos. Several grades of PVC are produced at this facility and the finished product is shipped out of the plant by truck and rail transport. The facility is currently permitted for a maximum production rate of 750,000 tons of PVC per year.

Westlake PVC had previously accepted a synthetic minor condition for a project that included two boilers and a No. 2 fuel oil tank. The boilers were to use natural gas as a primary fuel and No. 2 fuel oil as a secondary fuel. Recent economical trends has prompted Westlake to consider using an ethylene fuel oil combined with natural gas in boiler #2 that contains dual-fired jets. This removes the previous synthetic minor limit and triggers a PSD review. Only NO_x has the potential to emit above the significant impact level. The PSD review included significant impact level analysis and long-range, long-term modeling on Class I areas. The modeling demonstrates that there would be no impact on human health or the environment.

The PSD application was received on October 15, 2001. A stack test will be required to demonstrate compliance with the NO_x and particulate matter requirements. This permit is being issued as a combined PSD and Revised Title V permit.

COMMENTS:

Applicable Regulations

401 KAR 51:017 (40 CFR 52.21), Prevention of Significant Deterioration of Air Quality.

401 KAR 59:015 New Indirect Heat Exchangers.

40 CFR 60 Subpart Dc, Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units.

PSD REVIEW:

Westlake PVC is considered one of the 28 designated industrial source categories with a PSD threshold emission limit of 100 tons per year (TPY) for any criteria pollutant. The project, when first proposed, was given a synthetic minor limit to avoid PSD review. After some consideration, Westlake has requested to lift the synthetic minor for one boiler (#2) and proceed with a PSD review. Since both boilers were part of an initial project the potential emissions from both boilers must be considered for PSD review.

Westlake proposes to burn an ethylene fuel oil simultaneously with natural gas using dual-fire jets at proportions described in the permit. After evaluating the increase in potential to emit criteria pollutants, Westlake PVC has determined that only the increase in NO_x emissions will trigger a significant increase pursuant to 401 KAR 51:017, Prevention of Significant Deterioration. A PSD review was performed which included the following:

a. Demonstration of the application of Best Available Control Technology (BACT).
b. Demonstration of compliance with each applicable emission limitation under Title 401 KAR Chapters 50 to 63 and each applicable emission standard and standard of performance under 40 CFR 60 and 61.
c. Air quality impact analysis
d. Class I area(s) impact analysis
e. Projected growth analysis.
f. Analysis of the effects on soils, vegetation, and visibility.

BACT Analysis

For the BACT analysis, the EPA's RACT/BACT/LAER Information System (BLIS) was searched to determine commonly used technology for controlling NO_x formation. The analysis verified that Westlake must maintain low NO_x-burners with flue gas recirculation within Boiler #2. Two other control technologies, selective catalytic reduction and selective non-catalytic reduction, were considered for BACT but were not cost-effective and were eliminated as possible control technologies.

Air Quality Impact Analysis/Screening

The ambient air quality impact of the proposed modification was assessed by performing dispersion modeling analyses using the U.S. EPA's Industrial Source Complex Short-Term (ISCST3) model and software provided by BREEZE. The analysis and screening procedure included a Good Engineering Practice (GEP) stack height analysis with building downwash in cases where the stack height was below GEP. A Cartesian grid with 100 meter spacing was used for the receptor grid network and surface weather observations from Paducah, KY, were used as the meteorological data. Marshall county is designated as Class II for PSD increments.

The PSD increment for NO_x in a Class II area, such as Marshall County, is 25 $\mu g/m^3$ and the significant impact level (SIL) is 1 $\mu g/m^3$. The screening analysis indicates that the impact level is 1.8 $\mu g/m^3$ which is above the SIL meaning that compliance with the PSD increment and NAAQS is required for this criteria pollutant. A 20-D analysis was performed to establish a list of sources and the impact level that is pertinent to Westlake PVC. Since PSD has been triggered for this county in the past, all minor sources were also considered for impact analysis. Assuming a background concentrations of 24 $\mu g/m^3$, the resulting primary and secondary maximum predicted NO_x overall impact was 63.7 $\mu g/m^3$ which is below the NAAQS for NO_x which is 100 $\mu g/m^3$.

Additional Air Quality Impact Analysis

Additional analyses were performed to determine if any adverse health effects or long range impacts on Class I areas were possible. The conclusion from Westlake PVC is that there are no adverse health effects on plant vegetation or human health since the increase in NO_x concentrations is small and does not appreciably add to current levels. Using a CALPUFF Tier 2 analysis, Westlake has determined that there is no impact on Class I areas (Mammoth Caves and Mingo National Wildlife Area) indicating that emissions from this project would not adversely impact regional haze at either location.

Emission Source and Limits	**Pollutant**	**Em. Factor (lb/SCC unit)**	**Reference Source**	**PTE (tons/year)**
Boiler #1 (Nat. Gas)	CO	84	AP-42	27.3
649 SCC/yr	NO_2	36.8	Vendor	11.9
(SCC unit: $mmft^3$)	PM	7.6	AP-42	2.5
	SO_2	0.6	AP-42	0.2
	VOC	5.5	AP-42	1.8
Boiler #1 (Oil)	CO	5.0	AP-42	1.1
433 SCC/yr	NO_2	17.6	Vendor	3.8
(SCC unit: 10^3 gal)	PM	2.0	AP-42	0.4
	SO_2	7.72	AP-42	1.7
	VOC	0.2	AP-42	0.04
Boiler #2 (Nat. Gas)	CO	132	Vendor	16.8
255 $mmft^3$/yr	NO_2	50.6	Vendor	6.5
(SCC unit: $mmft^3$)	PM	7.6	AP-42	1.0
	SO_2	0.6	AP-42	0.1
	VOC	5.5	AP-42	0.7
Boiler #2 (Oil)	CO	18.72	Vendor	41.3
4411.1 SCC/yr	NO_2	15.29	Vendor	33.7
(SCC unit: 10^3 gal)	PM	2.0	AP-42	4.4
	SO_2	7.72	AP-42	17.0
	VOC	0.2	AP-42	0.4
Increase for the	**CO**			**86.5**
Whole Project	**NO_2**			**55.9**
Log B903 and	**PM**			**8.3**
# 54216	**SO_2**			**19.0**
	VOC			**3.0**

EMISSION AND OPERATING CAPS DESCRIPTION:

The emissions calculated by Westlake PVC and URS differ slightly for several reasons. The CO emission rate is different because URS used the emission factor 37 lb/SCC unit. Their intention was to use the emission factor described in AP-42, suggesting that their value was in error. Using the AP-42 emission factor for CO shows an increase in PTE by 15 tons per year above what Westlake PVC quoted in their application.

The remaining criteria pollutant PTE calculations by URS were also incorrect. Westlake has chosen to take a limit on the amount of natural gas and fuel oil to be burned in Boiler #1. The limit on natural gas is 649 million cubic feet per year. A 979 Btu/cubic foot heat content for natural gas and a 98.5 mmBtu/hr heat input results in only 6450 hours per year of operation on natural gas. For fuel oil, Boiler #1 is physically limited to burning only 71 mmBtu/hr. Fuel oil has a 141,000 Btu/ gallon heat content and is limited to 433,000 gallons per year which results in only 860 hours of operation on fuel oil per year. Using these limits, the calculated PTE emissions were lower than those determined by URS and Westlake PVC.

The Sulfur content in the ethylene fuel oil was not well described in the Westlake PVC PSD application. The ethylene fuel oil is a co-product from a propane cracking operation conducted by Westlake CA&O (21-157-00039) and has similar properties to fuel oil #2 except that it has low sulfur and nitrogen content. Westlake is required to test the fuel oil being burned for sulfur content.

Westlake is requesting permission to operate the #2 boiler using natural gas at 28.5 mmBtu/hr (255 $mmft^3/yr$) and ethylene oil for 70 mmBtu/hr (4411 Kgallons/yr) as primary fuel. The No.2 fuel oil can be used as a secondary fuel source or as a replacement to the Ethylene fuel oil. In the event that the #2 boiler becomes inoperable, Westlake requests that the control devices (dual-fire jets) from the #2 boiler be placed in the #1 boiler and the operating conditions for the #2 boilers are then adopted for the #1 boiler.

The operating conditions and pollutant potential to emit (PTE) described in the table above are the permit limits for Westlake for the two boilers. The initial permit, V-99-026, contained Synthetic Minor limits in the Operating and Emissions Limitations sections. Based on Westlake's PSD review, those synthetic minor limits were removed for Boilers #1 and #2 only. The emission limits then become only the allowables for PM, SO_2 and NO_x. The compliance demonstration method is mainly that only the fuel specified in the permit can be burned and the fuel usage must be monitored. Since the NO_x emissions results from a BACT analysis, the yearly emission of 60.13 tons per year is a BACT limit specified in the permit.

PERIODIC MONITORING:

Throughput for each fuel used and sulfur content of the fuel oils shall be monitored and recorded on a monthly basis for a 12-month rolling average. When fuel oil (Ethylene or No. 2) is burned, the visible emissions shall be visually monitored on a daily basis so as not to exceed 20% opacity.

OPERATIONAL FLEXIBILITY:

Westlake has requested that in the event boiler #2 is down for repairs, the dual-fire fuel jets be moved to boiler #1 and allow for the burning of natural gas and ethylene fuel oil in the same proportions and operating conditions as stated for boiler #2.

CREDIBLE EVIDENCE:

This permit contains provisions which require that specific test methods, monitoring or recordkeeping be used as a demonstration of compliance with permit limits. On February 24, 1997, the U.S. EPA promulgated revisions to the following federal regulations: 40 CFR Part 51, Sec. 51.212; 40 CFR Part 52, Sec. 52.12; 40 CFR Part 52, Sec. 52.30; 40 CFR Part 60, Sec. 60.11 and 40 CFR Part 61, Sec. 61.12, that allow the use of credible evidence to establish compliance with applicable requirements. At the issuance of this permit, Kentucky has not incorporated these provisions in its air quality regulations.